

Appl. No.: 10/707,634
 Amdt. Dated: 3/12/2006
 Reply to Office action of: 01/10/2006

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claim 1 (currently amended) ~~A Printed circuit board with~~ having an insulated metal substrate with an integrated cooling system, ~~of the type comprising: a metal substrate (10); at least one electrically insulating layer (11) adhered to said metal substrate (10); and several electro-conducting tracks (12) capable of interconnecting electronic power components (24), or a metal layer intended to be transformed into said electro-conducting tracks (12), adhered to said electrically insulating layer (11);~~ characterized in that wherein said metal substrate (10) incorporates several at least one heat transporting ~~channels~~ cavity (13), having at least one opening (14) at one edge (19) of said metal substrate (10), which comprise several conduits said at least one heat transporting cavity (13) having located therein a conduit for a heat-carrying fluid, said conduits which extending by way of said at least one opening (14) to the outside of the and upward from, said metal substrate (10) up to forming a sealed heat transfer area to in an external heat transfer medium.

Claim 2 (canceled)

Claim 3 (currently amended) ~~A printed circuit B~~ board according to claim 2 1, characterized in that said heat-carrying fluid conduits are heat pipes (20) that are closed on both ends and partially full of heat-carrying fluid, with an evaporation region (21) inside of the metal substrate (10) and an external condensation region (22) extending with an inclination a distance outside of the metal substrate (10) and which is in contact with ~~the~~ an external heat transfer medium comprising circulating air.

Claim 4 (currently amended) ~~A printed circuit B~~ board according to claim 2 1, characterized in that said at least one ~~cavities~~ (13) ~~are~~ is a through ~~cavities~~.

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Claim 5 (canceled) A printed circuit Bboard according to claim 1, characterized in that said conduits comprise ~~several~~ a plurality of cavities (13) ~~placed all~~ positioned in a direction that is substantially parallel to said electrically insulating layer (11), at least one of the ends of each one of said plurality of cavities (13) opening into ~~an~~ a plurality of corresponding openings (14) located on at least one edge (19) of the metal substrate (10), ~~whose each of said plurality of~~ openings (14) is being coupled with a span of a pipe (20 17) for said heat-carrying fluid, forming a heat transfer area extending upward into said heat transfer ~~area~~ medium.

Claim 6 (currently amended) A printed circuit Bboard according to claim 5, characterized in that each ~~one of the~~ said plurality of cavities (13) has a blind end (16) and ~~has only one~~ an open end having opening (14) on one of the said edges (19) of the said metal substrate (10) in which said span of pipe (17) is coupled at a proximal end, ~~which is provided with~~ said span of pipe (17) further having a blind distal end (18), ~~the~~ said cavity (13) and said span of pipe (17) assembly ~~constituting~~ forming a heat pipe in which ~~the~~ said cavity (13) performs the functions of an evaporation region (21) inside of the substrate (10) and ~~the~~ said span of pipe (17) performs the functions of a condensation region (22) in contact with ~~the~~ an external heat transfer medium comprising circulating air.

Claim 7 (currently amended) A printed circuit Bboard according to claim 6, characterized in that ~~the~~ said openings (14) have further comprise a countersink opening (15) for receiving ~~the~~ said proximal ends of ~~the~~ said respective spans of pipe (17).

Claim 8 (currently amended) A printed circuit Bboard according to claims 1 2 or 5, characterized in that said cavities (13) have a circular cross section.

Claim 9 (currently amended) A printed circuit Bboard according to claim s 1 2 or 5, characterized in that said cavities (13) have a polygonal cross section.

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Claim 10 (currently amended) A printed circuit Bboard according to claim 4, characterized in that said plurality of cavities (13) are parallel to each other and have a longitudinal opening along ~~its entire extension~~ substantially the entire length of each of said plurality of cavities (13) opening onto a side of the metal substrate (10) that is opposite the side thereof on which said electrically insulating layer (11) and electro-conducting tracks (12) are fixed, such that the metal substrate (10) has a cross section shape that is suitable for easily being obtained by extrusion.

Claim 11 (currently amended) A printed circuit Bboard according to claim 4 or 6, characterized in that said metal substrate (10) is formed by two layers (10a, 10b) joined together, said cavities (13) being formed by the juxtaposition of two semi-cavities (13a, 13b) formed respectively on each one of the layers (10a, 10b) of metal substrate (10).